

# Aquaculture in Utah

## Newsletter on Current Trends in Aquaculture



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### **PROLIFERATIVE KIDNEY DISEASE AGENT IN UTAH**

A pathogen causing proliferative kidney disease (PKD) was unknown at the beginning of the century, but has developed into a serious problem in farmed salmonids in Europe and North America. The infection appears in late spring or early summer, when a parasite infects the kidneys and spleen causing immune cells to multiply, harming these organs and resulting in anemia, bloating, discoloration and sometimes death. Mortality can be high and sometimes fish stocks can be wiped out. This can result in a significant economic loss to the fish farmer.

It was first believed in 1924 that an amoebic parasite was the cause of the disease. In the 1980s it was shown that the organism belongs to a group of tiny parasites known as Myxozoa, but because it does not develop to its final form in salmonids, it has not been possible to identify it further. It has recently been discovered in 1999

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### **UTAH IS DESIGNATED AS FEDERAL DROUGHT DISASTER AREA**

The U.S. Department of Agriculture (USDA) recently designated the entire state of Utah a primary natural disaster area due to drought. The designation comes as Utah is suffering through its 5<sup>th</sup> straight year of severe drought conditions. Water storage and stream flows in the state are approximately half of normal, and rainfall is forecast to be less than normal.

Utah is currently the driest state in the country according to the USDA. This designation makes farm operators (including fish farmers) in all 29 Utah counties eligible to be considered for low-interest emergency loans from the Farm Service Agency (FSA), provided the eligibility requirements are met. The Farm Service Agency can be contacted in Utah at (801) 524-4536.

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### **PCR USED AS A CONFIRMATORY TEST FOR WHIRLING DISEASE**

A new tool has been recently validated for the detection of whirling disease. It is known as the polymerase chain reaction test or PCR. The significance of PCR lies in that it can detect a segment of the genetic material of the *M. cerebralis* parasite. It can be used at any stage in the parasite's complex life cycle to immediately identify the whirling disease parasite. PCR is a common method of creating copies of specific fragments of DNA.

PCR will be used as a confirmatory test for whirling disease in Utah beginning this fall with all inspections. Initial screening is done by the pepsin/trypsin digest method in five fish head pools. If spores are detected, confirmation will be undertaken by PCR for pools of digests that show spores. Trout must be in the facility waters at least 4 months (at a constant minimum temperature of 12° C (54° F)) for the PCR method to be used. PCR is not approved for standard inspections, but it may be used as a confirmatory method for WD.

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### BIOSECURITY PROTOCOL FOR FISH FARMS

Biosecurity protocols are designed to keep the spread of fish pathogens from one farm to another. Bacterial, viral, and parasitic diseases of fish may be easily spread if not properly controlled. Possibly the greatest risk facing fish farmers is the introduction of new diseases into established farms. Those mechanisms that pose the biggest hazard include:

- Bringing infected fish onto the farm from another fish farm or from the wild;
- Transfer of contaminated equipment (e.g. seines, aerators, and trucks) between farms;
- Animal vectors, including birds and other fish predators;
- Using contaminated water.

Farmers avoid introducing new pathogens by following procedures which block these modes of disease transfer. New fish must always be inspected for known pathogens before the fish are brought onto the farm. They must test clean. When practical, trucks, seines and other equipment used to move fish from one facility to another should be disinfected and allowed to dry before reuse. Keep animals and birds out of hatchery waters, even if animal control permits are needed to destroy them. The safest water for fish production and hauling is water pumped directly from a well. Enclosed wa-

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### A GUIDE TO STORAGE AND HANDLING OF FISH FEED

Anything that can be done to minimize waste of fish feed will help make an aquaculture operation more cost effective. Improper handling and storage can lead to fish feed being unusable and possibly detrimental to fish. Five things should be kept in mind when properly handling and storing fish feeds.

1. When unloading feeds, do not throw or drop the bags: both of these practices can break up the pellets, leaving a higher percentage of very small particles. Walking on the bags or stacking them over 10 bags high also leads to the pellets being crushed. Larger fish may not feed on these "fines."
2. Try to store feeds in cool, dry areas away from direct sunlight. Many of the essential nutrients contained in feeds are highly sensitive to light and heat, and exposure to these conditions can significantly shorten shelf life.

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### PKD FOUND IN UTAH

that an obscure group of freshwater organisms, known as bryozoans (*Fredericella*) harbor the infective stage of PKX (*Tetracapsuloides bryosalmonae*). Scientists first used new tools of molecular biology to identify the bryozoans. They showed identical genetic material (DNA) of PKX in the bryozoans and the infective agent in rainbow trout, thus identifying bryozoans as the carrier of the alternate infective stage. Scientists obtained final proof of the discovery when the infection was transmitted experi-

### STORING FISH FEED contd

3. It is best to establish a regular rotation for feed stocks and try to stock dry feeds for no more than 90 days. Unused feed may be kept in a refrigerator for up to 150 days.
4. Bagged dry feeds should always be stored on pallets away from walls. This allows air to circulate around the bags and helps control both the temperatures and the amount of moisture that the bags are exposed to.
5. Avoid exposing dry feeds to excessive moisture, as it can lead to rapid growth of molds. Many fish species are sensitive to the toxins produced by molds. It is more cost effective to throw out suspect feed than to take a chance at causing health problems for your fish.

These few suggestions should help you to properly handle your fish feed and should help to reduce feed costs.

*Excerpts from Aquaculture Magazine March/April 2003*

### PKD contd

mentally from bryozoans to rainbow trout, which subsequently developed the disease. PKX is listed as a prohibited pathogen in Utah and requires strict control measures of the infected trout. During the early summer of 2003, PKX was found at a fish farm in Utah, and the infected trout population was killed and buried with quick lime. The fish had been imported from Trout Lodge, which since this discovery has confirmed the presence of PKX and has been removed from the approved list for live fish imports. This excludes eggs, which are not infected by PKX.

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## **DROUGHT ASSISTANCE AVAILABLE FOR UTAH FARMERS**

The Utah Department of Agriculture and Food has two loan programs designated for Utah farmers or ranchers. They are the ARDL and the Rural Rehab loan programs. The ARDL program is designed for eligible conservation projects. The Rural Rehab loan program is designed for refinancing troubled debt, which could have been caused by drought or other problems.

The U.S. Department of Agriculture (under the direction of the Soil Conservation Commission) administers the Agriculture Resource Development Loan Program or "ARDL." The goal of the program is to aid farmers and ranchers to conserve soil and water, increase agricultural yields, maintain and improve water quality, conserve and improve wildlife habitat, prevent flooding, develop on-farm energy projects, and mitigate damages resulting from natural disasters (e.g. flooding, drought, etc.).

The ARDL program provides low interest loans to farmers, ranchers, and fish farmers for projects which meet the conservation and pollution control goals of the program. These may include animal waste management, riparian improvement, water usage management, re-seeding watershed and erosion

continued

## **DROUGHT DISASTER Cont**

control, etc. The project is assessed a 4% administrative fee, and the interest rate is a low 3% per year. Payments can be made yearly or monthly.

Recipients of ARDL loans must meet given criteria. For example, the U.S. Department of Agriculture defines a "farm" as an operation of five or more acres with annual sales of at least \$1,000.00. Any private farm or ranch operator who meets this definition is eligible to apply for an ARDL loan. The planned projects must be applied to farmland or ranchland.

An application can be obtained from the Utah Department of Agriculture from Dick Sandberg (Loan Specialist) at (801)538-7030. Return the completed application to your local county soil conservation district supervisor.

The Rural Rehabilitation Loan Program has loans for refinancing troubled debt which could have been caused by drought or other problems. The purpose is to save agricultural operations that become viable with more favorable financing. The maximum term of the loan is 10 years, and interest rates vary from 3% to 6% with no fees. This program provides low cost, long-term financing to enhance cash flow.

Recipients of rural rehab loans must meet certain criteria. They must have been turned down for

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### **BIOSECURITY**

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ter systems are also critical for proper hatchery management.

When fish populations quit feeding, behave strangely, or suffer significant mortality, contact the Fish Health Program of the Utah Department of Agriculture and Food for assistance. Prevent movement of fish, water or equipment from the pond until a diagnosis is determined. If a prohibited pathogen is found, the UDAF will take action to contain the pathogen.

*Excerpts from Aquaculture Magazine March/April 2003*



### **DROUGHT DISASTER cont**

the same type of loan at least three times from three other lenders. A letter for each denial must be provided to UDAF verifying such. The recipient must be the owner of a farm or ranch that produces legitimate agricultural products. The loans must be well secured by marketable assets. The money is available on a first come-first serve basis. Loans are generally limited to \$150,000.00. Applications must be submitted to the UDAF.

Additional UDAF loan information may be obtained from our web site at <http://ag.utah.gov/mktcons/agloans.html>.

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### **COLORADO ALLOWS IMPORTATION OF WILD TROUT FROM UTAH INTO SPECIFIED WATERS**

Ken Cline of Cline Trout Farm, Colorado, has procured trout infected with WD from a fish farm in Utah and moved them into specified waters in Colorado on two separate occasions. A separate movement of live, WD positive fish occurred for shipment this fall to an Idaho processing plant. In order for a hatchery owner to sell live whirling disease infected fish into adjacent states in the future, the following terms and conditions must be met for each transport:

1. Verbal approval must be obtained by fish health officials of the Utah Department of Agriculture and Food (UDAF) from the Colorado State Veterinarian;
2. A fish importation license must be provided to the UDAF fish health officials from the Colorado Division of Wildlife;
3. Verbal approval must be obtained by UDAF fish health officials from the Colorado Division of Wildlife fish importation license administrator;
4. Verbal approval must be obtained by UDAF fish health officials from the Colorado Division of Wildlife, Chief of Fisheries;
5. Receipt of a written statement from the facility owner concerning the proposed

shipment;

6. Receipt of a written statement from the shipper or vehicle transport operator that his truck was clean before coming into Utah and that no stops will be made in Utah after the fish are loaded;
7. This shipment destination must be made known to UDAF fish health officials;
8. Verbal approval must be obtained by UDAF fish health officials from the Utah State Veterinarian authorizing the sell of the WD trout; and
9. When these conditions are met, UDAF fish health officials may provide approval of the movement of the WD trout from Utah.

### **NEW FEE-FISHING FACILITIES LICENSED BY UDAF**

Twelve new fee-fishing facilities have been issued CORs since our last newsletter. These facilities (along with adjacent localities) include J. Kemp Snow (Orangeville), Wolf Creek Ranch (Woodland), Stuart Wansley (Laketown), Joseph R. Schmutz (Mayfield), Spring Creek Trout Farm (Liberty), David M. Trimmier (Sandy), Six Mile Reservoir (Randolph), Garth Stookey (Rush Valley), Skyview Ranch (Bluebell), Sun River Golf Course (St. George), Pivotal Promontory (Park City), and Alexis XI (Torrey).

### **CRITERIA FOR APPROVING AND RENEWING FEE-FISHING FACILITIES**

Below is a policy made by UDAF for the licensing of fee-fishing facilities. The policy was effective October 24, 2003. At the end of 2004, the policy will be used to determine the intent of applicants to conduct fee fishing operations.

1. UDAF fish health personnel will determine the licensing intentions of each inquiring party.
2. The applicant must express intent to be licensed for fee fishing. If the applicant wishes to have a pond for private use only, then UDAF will direct him/her to DWR.
3. Completion of the UDAF COR application shall be evidence of the applicant's fee fishing intention.
4. The applicant's pond shall be large enough to support at least 50 adult fish of the requested species at any given time.
5. Fee fishing shall commence within 12 months after UDAF issues the permit.
6. The fee fishing activity of each licensee will be determined by UDAF at the time of license renewal. If documented fee-fishing activity has not been conducted or commenced within the previous 12-month period, then UDAF may not renew the license. In such cases, the pond owner's name will be forwarded to DWR for private pond licensing.



## EFFECT OF PARTIAL TANK COVERS ON THE GROWTH OF JUVENILE RAINBOW TROUT

A study was conducted at South Dakota State University to determine the effect of a partial cover over circular hatchery tanks on trout growth. Partial tank covers (29%) were studied for their effect on the growth of young rainbow trout during hatchery rearing. It was observed that in tanks without cover, the trout often moved continually and erratically around the edge. In contrast, the trout in the tanks with partial cover concentrated under the cover and remained relatively motionless. Trout reared in tanks with partial covers averaged 93 mm long at the end of a 55 day period of rearing, which was significantly longer than the 88 mm mean length of trout reared in uncovered tanks for the same period of

time. The total weight gain of trout in partially covered tanks was 15.4 kg during the period and 13.5 kg in uncovered tanks. Partial cover probably increased trout growth by decreasing energy expenditures and possibly by reducing the stress associated with the inability of the fish to find refuge in uncovered tanks. Even though no significant differences in percent mortality were observed in fish reared with or without partial covers, partial tank coverings may reduce predatory losses. Research has proven that juvenile rainbow trout predation rates decreased with the presence of a cover. Based on the results of this study, it was determined that the use of partial tank covers during rearing of juvenile rainbow trout in circular tanks improves fish growth. *Excerpts taken from North American Journal of Aquaculture 65:344-348, 2003*

## POND ALGAE DESTROYED BY ULTRASONIC DEVICE

A Dutch company called Consultimex claims its new Aquasonic ultrasonic devices effectively destroy algae in all types of fish ponds, thus reducing the need for chemicals. The environmentally friendly Aquasonic devices are distributed worldwide by Consultimex and are available in the USA through a company called Superior Aquaculture.

Consultimex says, "Our new products are proving to be the simplest and most effective method of killing nearly every form of algae, whether floating or rooted, while at the same time providing an algae-prevention

system."

The functioning mechanism is a submerged transducer, specifically designed and built to be small and water-resistant. The device transmits a complex pattern of ultrasonic vibrations through the water, causing the algae cell "vacuole to implode." It generates the ultrasonic vibrations that kill the algae. With the device installed, any new growth of algae will be destroyed. Consultimex claims their devices are harmless to all other life forms, including other aquatic organisms and humans. For further information contact [www.consultimex.com](http://www.consultimex.com) *Excerpts from Fish Farming International March 2003, Volume 30, No. 3*

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### RECIPE CORNER

We will be sharing fish recipes from our Aquaculture providers in our newsletter on a routine basis. In this edition we have printed three outstanding recipes obtained from Steve Judd. Please send your favorite recipes. We will publish them in future newsletters.

#### Trout Fillet Bar-B-Q

1. Marinate trout fillets in Kraft Zesty Italian Dressing for as long as possible (at least 1 hour)
2. Grill the marinated fillets on medium heat, skin side down for 10-12 minutes
3. Season with lemon pepper to taste
4. Tuna fish can be made by adding mayonnaise to any left over fish

#### Smoked Fish

1. Marinate fillets in a gallon ziploc bag with 1/3 cup salt and 1 cup brown sugar and mix. Add water to cover the fish
2. Set in refrigerator for two hours, then dry fillets
3. Add 1/3 cup liquid smoke in new gallon ziploc bag to fillets for 15 minutes or more, depending on how smoky you want the fish to taste
4. Cook on grill after seasoning with your favorite spice (If you don't have a smoker, you can prepare the fish in an oven at 200 deg. F.)
5. Run 2 1/2 hours in smoker, slightly longer for jerky (burn cherry or apple wood)

#### Battered Fish\*

1. Mix 1 cup corn meal with 3 cups flour, 1/4 cup lemon pepper, and 1/4 cup red cajun \*spice in a large bowl
2. Stir in 1/4 to 1/2 tsp. garlic powder and 1 tbsp. cyan \*pepper
3. In a separate bowl, mix 4-5 eggs with 1/4 cup milk
4. Place fillets in the flour mix first then the egg mix and then the

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### OMEGA-3 FATTY ACIDS ADD TO GOOD HEALTH

Fish oil from fresh fish contains omega-3 fatty acids, one of the two main classes of essential fatty acids (omega-6 fatty acids are the other main type). Essential fatty acids are fatty acids that the body needs as much as it needs vitamins and minerals.

Studies of Eskimo people, who eat high amounts of fish, revealed that they seldom suffer heart attacks. This is presumably true because of their typical high intake of omega-3 fatty acids.

Subsequent investigation found that the omega-3 fatty acids found in fish oil can lower blood triglyceride levels, thin the

blood, raise HDL (good cholesterol), lower blood pressure, prevent strokes, lower levels of homocysteine, help arthritis and decrease inflammation in various parts of the body. Beneficial doses of omega-3 fatty acids are at least 1,000 mg/day.

In Aquaculture Magazine (July/August 2003) an article titled, "Farmed Fish and Fatty Acids" states that farmed fish are not as nutritional as wild fish, because farmed fish have a lower percentage of omega-3 fatty acids. It argues that farming fish increases the amount of omega-6 fatty acid content in fish. While omega-6 fatty acids are essential for good health, we may already get too much in our diets. Omega-6 competes with omega-3 in our bodies, so high intakes of omega-6 can actually counter

the health benefits of omega-3.

Our main sources of omega-6 are vegetable oils, processed foods, and meat from farmed land animals. Meat such as chicken, beef and pork has high amounts of omega-6, because they are raised on grain. Grain intake is what mainly increases the omega-6 content of the meat. Fresh fish are supposed to be something we can get omega-3s from without too much omega-6s. The farming of fish are changing that belief, because a higher percentage of grain products are being used in fish food. This is why omega-6 levels in farmed fish are high compared to wild fish. An average serving of wild fish provides your daily-recommended amount of omega-3 fatty acids. But farmed fish also delivers those omega-3s, along with omega-6s.

### RECIPES

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*flour mix again*

5. *Place in a deep frying pan of hot (350 deg. F) oil and fry for 3-4 minutes*

*\*Spices optional*

*Tarter Sauce—Mix chopped pickle relish with mayonnaise in a small bowl and add a pinch of yellow mustard for color.*

### AMMONIA AND pH INTERACTION

When monitoring water quality it is important for producers to understand the daily shifts in pH and their effects on unionized (toxic) ammonia concentrations. First, for ammonia measurements to be accurate, pH and ammonia measurements must be measured at the same time.

Second, ammonia and pH should be tested late in the afternoon for best accuracy.

Ammonia is a nitrogen waste released by fish into their aquatic environment. Ammonia is toxic to aquatic animal life and this toxicity is affected by the pH of the environment. Ammonia-nitrogen is more toxic when the pH is high and less toxic when the pH is low. In addition, ammonia toxicity increases as temperature rises.

The measure of whether water is acidic, basic or neutral is known as pH. A scale of one to fourteen (1-14) is used to measure the pH range. A pH of 7.0 is neutral; above 7.0 is basic and below 7.0 is acidic.

The interaction of photosynthesis and respiration throughout the day creates changes in the pH of a pond. For example, pond pH would be lowest an hour or two before sunrise. Pond water becomes most acidic during early morning and most alkaline after several hours of daylight.

As photosynthesis occurs during the day, the CO<sub>2</sub> in the water diminishes. This lowers the level of carbonic acid, and the pH raises. The pH should be at its highest (most toxic level for ammonia) at the late afternoon. The opposite occurs during the night. Photosynthesis stops, CO<sub>2</sub> increases, pH diminishes, and the toxicity due to elevated ammonia decreases.